

Puget Sound Nutrient Modeling

Nutrient pollution is considered one of the largest threats to Puget Sound. Recognized nation-wide, the following characteristics of nitrogen pollution apply equally and imperatively to Puget Sound:

- Human acceleration of the nitrogen cycle over the past 40 years is far more rapid than almost any other aspect of global change.
- Nutrient pollution leads to hypoxia and anoxia, degradation of habitat quality, loss of biotic diversity, and increased harmful algal blooms.
- Technical solutions exist and should be implemented, but further scientific work can best target problems and solutions, leading to more cost effective solutions.

This proposal lays out a plan for the Washington State Department of Ecology (Ecology), working collaboratively with EPA, to conduct nitrogen pollution modeling in Puget Sound, to complement associated regulatory and management initiatives (see complementary AKART proposal). This work is being conducted as part of EPA's and Ecology's mandate under the Clean Water Act to manage pollutant loading to meet water quality standards.

Project Objective

Use Puget-Sound-wide hydrodynamic models at three scales to answer the following nutrient management questions:

- Are current nitrogen loadings from point and nonpoint sources in and around Puget Sound significantly impacting water quality at a large scale?
- What nutrient reductions are necessary to reduce or eliminate human impacts to biomass and dissolved oxygen levels in sensitive embayments?

Project Description

This project consists of four parts:

- I.** Establish a set of multi-purpose hydrodynamic models for the entire Puget Sound at three scales, large, intermediate, and fine. This work will be done by contractual agreement, building on work already completed. These models can also serve as community tools for other purposes.
- II.** The large-scale model (also called "box model") will be used by Ecology to do a screening-level evaluation of nutrient effects on dissolved oxygen, Puget-Sound-wide. The results of this effort will inform the more detailed work below.
- III.** The intermediate-scale model (also called "coarse grid model") will be used by Ecology to evaluate the effect of human-caused nutrient enrichment on dissolved oxygen across Puget Sound. This model will help inform potential Puget-Sound-wide management strategies and decisions. It will also inform the more detailed work below.
- IV.** The fine-scale model (also called "high-resolution grid model") will be used for site-specific studies, including Total Maximum Daily Load or related studies in critical areas with known dissolved oxygen problems. This model can also be used to evaluate potential causes of nuisance algae, such as excess sea lettuce accumulating on beaches, by differentiating the local (tributary) vs greater Puget Sound contributions of nutrients.

A technical advisory committee comprised of stakeholders will be used to help advise this work.

Schedule: Parts I- III: July 1, 2008 – June 30, 2009; Part IV: July 1, 2009 – June 30, 2010.

Budget Total: \$740,000